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Matters left pending and other issues arising from the programme elements of the IPF process

Valuation of forest goods and services; economic instruments, tax policies and land tenure; future supply of and demand for wood products and non-wood forest products; and rehabilitation of forest cover

Note by the Secretariat

Summary

This note, on some major issues relating to the valuation of forest goods and services; economic instruments, tax policies and land tenure; future supply of and demand for wood products and non-wood forest products; and rehabilitation of forest cover, is prepared in order to facilitate the background in support of the discussion on these topics by the Forum at its second session. It raises a few questions which the Forum may wish to consider and seeks the Forum's guidance in preparation of the report that will be the basis for substantive discussion at the third session.

This note is based on material prepared by the Food and Agriculture Organization of the United Nations and the World Bank as lead agencies for these topics within the informal, high-level Inter-Agency Task Force on Forests.

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I. INTRODUCTION

1. This note is prepared as a supporting document to a background discussion on parts of category II.d of the programme of work set out in the report of the Intergovernmental Forum on Forests (IFF) on its first session (E/CN.17/IFF/1997/4) - namely, the valuation of forest goods and services; economic instruments, tax policies and land tenure; future supply and demand of wood products and non-wood forest products; and rehabilitation of forest cover. At that session, IFF emphasized the need to build on the positive results achieved by the Commission on Sustainable Development Ad Hoc Open-ended Intergovernmental Panel on Forests (IPF) and to consider matters left pending and other issues arising from the programme elements of the Panel process. This note, therefore, recalls in the final report of the Panel (E/CN.17/1997/12) the conclusions and proposals for action relevant to the above issues. It reviews major aspects of those issues and summarizes some of the main conclusions.

2. This note is based on documentation prepared by the lead agencies for these topics in the informal, high-level Inter-Agency Task Force on Forests. For the first two issues, the lead agency is the World Bank, and for the last two, it is the Food and Agriculture Organization of the United Nations (FAO).

II. MANDATE

3. Category II of the IFF programme of work mandates the consideration of "matters left pending and other issues arising from the programme elements of the IPF process". The section of the mandate stipulating the work under programme element II.d, concerning the topics of this note states:

> Consider ... valuation of forest goods and services; assessment, monitoring and rehabilitation of forest cover in environmentally critical areas; ... the use and application of the range of economic instruments, including tax policies and land tenure arrangements as a means of promoting sustainable development; and future supply and demand of wood and non-wood forest products and services.

4. These issues will receive substantive discussion at the third session of IFF.

III. MATTERS LEFT PENDING AND OTHER ISSUES

5. Even if the topics under consideration in this note are interrelated, they will be treated separately. Some, however, should be read in combination - since, for example, valuation of forest goods and services is only meaningful if directly linked to economic instruments. Because of constraints in the length of official documentation, the current note, out of necessity, treats each of the four topics in a summary fashion.

A. Valuation of forest goods and services

1. IPF proposals for action

6. The Panel's discussions on the valuation of forest goods and services resulted in several proposals for action. Inter alia, the Panel encouraged countries, in collaboration with international organizations, to make use of available methodologies to provide improved estimates of the value of all forest goods and services. It requested international organizations and relevant institutions to prepare comprehensive documents on the available forest valuation methods and data sets required for the evaluation of forest goods and services, in particular those that were not traded in the marketplace. The Panel also invited countries and relevant international organizations and institutions to promote research to further develop forest valuation methodologies, in particular those related to deforestation and forest degradation, erosion, and criteria and indicators, taking into account the particular circumstances of each country.

2. Major issues in valuation of forest goods and services

7. The methods for valuation of wood forest products destined for timber and fibre use are well established and were discussed in detail during the Panel's discussions. Therefore this note will focus on the creation of markets for non-timber forest values. Forests provide a wide variety of local, national, and global services, including carbon sequestration, biodiversity conservation, recreation, and watershed protection. These benefits, however, do not usually accrue to the forest owner or manager, who therefore lacks both incentives and funds to maintain them. In principle, if beneficiaries of these environmental services paid for them, forest conversion would be reduced and standing forests would be better maintained.

8. In practice, what is the scope for this kind of financing mechanism? Astronomical calculations of forest values, such as one of $4.7 trillion, emphasize our concern for forests but provide little guidance. Setting aside arguments about the derivation of the numbers, the point is that conservation depends on marginal, not total, values. What needs to be considered are mechanisms to influence the forest conversion or exploitation decisions of the landholder at the forest frontier. Five non-timber forest services are often cited as potentially generating incentives for conservation:

(a) Carbon sequestration

9. Carbon sequestration appears to be the largest and most generally applicable non-timber forest service that can potentially be developed in the near-to-medium term. A market for this service may be created under the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which sets limits on developed countries' greenhouse gas emissions but may permit them to meet those limits in part by acquiring offsetting emission reductions from other countries. The eligibility of forest-based emission reductions for this purpose is still under discussion. If such trading is allowed, rough simulations suggest that in 2010, 1 billion tons of carbon allowances, or

emission reductions, would be traded, at a price above $30/ton. This estimate does not allow for emission reductions from forestry, whose inclusion would boost the quantity traded and reduce the price. Depending on the eligibility rules for projects and on the cost of producing emission reductions - both now subject to great uncertainty - the market for forestry-based emission reductions might encompass hundreds of millions of tons of carbon and billions of dollars per year.

10. For a significant market in forest-based sequestration services to emerge, these technical issues must be satisfactorily resolved, the parties to the Framework Convention must agree to allow forest-based emission reductions from developing countries, and the Kyoto Protocol must come into force.

(b) Hydrological services

11. Conventional wisdom accords forests a significant economic role in preventing the silting of hydropower facilities, protecting the quality of drinking water, maintaining the flow of water in the dry season, preventing flooding, and generating local rainfall. In reality, the magnitude and even direction of these impacts is variable and highly sensitive to local economic and bio-geophysical conditions. For instance, hydrological theory and evidence suggest that deforestation often increases rather than decreases dry season flows. Sediment impacts depend on the proximity of deforestation to streams, the gradient of watersheds, and the presence of at-risk facilities such as power stations in the watersheds. The local climatic impacts of deforestation are very poorly understood, but theory suggests that the impacts depend greatly on the scale of deforestation, and that moderate amounts of deforestation could increase local rainfall.

12. Maintenance of forest cover in urban watersheds may be a cost-effective means of maintaining the quality of water supplies for urban consumers and for freshwater and marine fisheries. Similarly, maintenance or regeneration of riparian forests can disproportionately reduce sedimentation, intercept agrochemical runoff from fields, and play a role in maintaining habitat connectivity for biodiversity. There are several markets for hydrological services based on this rationale, including payments by New York City for watershed protection, the Quito Watersheds Conservation Fund in Ecuador, Costa Rica's environmental services payment system, and the Conservation Buffer Initiative in the United States.

13. In general, however, the hard hydrological data and analyses that could justify, for instance, spending public funds on watershed protection rather than water filtration are lacking. In the absence of these analyses, it is difficult to assess the potential scale of markets for hydrological services.

14. In principle, downstream users could pay loggers for the service of not creating sedimentation. Alternatively, one could apply the "polluter pays principle", as is standard for other types of water pollution, imposing sediment discharge fees on loggers. In practice, most jurisdictions impose regulations on logging practices so as to minimize sedimentation.

(c) Biodiversity

15. Bioprospecting is an emerging source of forest-based revenue. While estimates of the potential value of forest-based pharmaceuticals range into the hundreds of billions of dollars, existing transactions are modest. A recent review attributes this to the growing success of synthetic chemistry in finding promising compounds. Over time, the industry may shift from a focus on identifying individual antibiotics to identifying entire genes or sets of interacting chemicals. Such a shift would increase the comparative advantage of bioprospecting relative to laboratory synthesis.

16. Currently, and probably for the foreseeable future, bioprospecting revenues will not be strongly linked to the sheer area licensed for exploration but rather to cleverness in selecting samples for screening. One rough theoretical calculation puts the average bioprospecting value, in the area of the highest and most distinctive biodiversity, at about $2/hectare with more typical values of less than $0.10 even for areas of great biodiversity significance. However, where ancillary information can be used to pinpoint promising areas, per-hectare values may be considerably higher.

17. If biodiversity conservation is a public good enjoyed by the world, it is appropriate to seek direct international sources of financing for conservation. In the long run, it is possible that market mechanisms similar to those under discussion for carbon will be developed to compensate forest owners and managers directly for biodiversity conservation services. This is most likely to happen in areas of notable biodiversity richness and uniqueness.

(d) Non-timber forest products

18. Natural forests produce an immense range of non-timber products. These are often of critical importance to forest dwellers who rely on non-timber products to provide them with a source of income. In some cases, these products have been able to tap into a broader national or international market. The most prominent example is rattan.

19. Early calculations showing extremely high theoretical per-hectare values of these products have given way to a sober realization of the considerable barriers to marketing new products. They include the high labour costs of extracting products from species with low densities per hectare, the danger of overexploitation, and keen competition from substitute products and from domesticated production. Realistic net rental values associated with the extraction of non-timber forest products are probably $10-15 per hectare for favourable areas. Prospects for generating conservation incentives via non-timber forest products are site-specific and limited.

(e) Eco-tourism

20. Information on the scale and prospects of forest-based eco-tourism is scant. One estimate places the global economic impact of all nature-related tourism at between $83 and $166 billion. If this were accurate, achievement of even a small share for forest-related tourism would represent a substantial market for forest services. A realistic measure of current prospects is

provided by the Monteverde Cloud Forest Biological Reserve in Costa Rica. One of the most famous and successful forest tourism destinations in the developing world, it collects annual entrance fees of about $50/ha. In the very long run, the combination of a growing world population, higher world incomes, decreased transport costs, and diminishing forest areas will boost the recreational value of areas now considered remote.

(f) Implications for research and development

21. To facilitate the emergence of a market for forest-based carbon emission reductions, work is needed on developing measurement and verification protocols and on projecting the economic and environmental effects of such a market. To facilitate the emergence of markets for watershed services, far more effort must be invested in hydrological measurements and economic analyses of potential interventions.

B. Economic instruments, tax policies and land tenure

1. IPF proposals for action

22. Discussion by the Panel did not specifically address the issue of economic instruments, tax policies and land tenure. There were, however, many proposals for action that called for creating enabling policy and economic environments to promote sustainable forest management. This section aims at supporting the background discussion on how that can be achieved.

2. Major issues in economic instruments, tax policies and land tenure

23. Regulations on land use and forestry have two broad goals:

(a) To preserve environmental and other non-timber forest values;

(b) To raise revenue for the forest owner - often, but not always, the Government itself.

24. A positive economic approach to forest policy examines the economic, fiscal, and environmental impacts of alternative tax and regulatory regimes. A normative approach seeks economic instruments that are cost-effective in achieving environmental goals and efficient in appropriating rents for forest owners without introducing economic distortions. Both approaches are in their infancy. This note describes the principal issues; firm empirical answers are mostly lacking.

25. It is convenient, though somewhat artificial, to break the land allocation problem into two decisions:

(a) How much forest land to convert;

(b) How to manage those areas designated to remain under forest cover.

(a) The land-conversion decision

26. To achieve environmental, conservation, and economic goals, regulatory authorities seek to divide natural forests among three classes: full protection; multiple use, including both conservation and production of timber and non-timber products; and complete conversion to agriculture or plantation forest. Two overarching issues are:

(a) On what basis should land be allocated among the classes?

(b) What instruments are available to bring about this allocation?

(i) The basis for allocating land

27. From a normative standpoint, forestland ought to be allocated so as to achieve non-monetizable environmental goals (such as biodiversity preservation) in a cost-effective manner. A growing literature in conservation biology describes "reserve site selection" methodologies which attempt to minimize the cost (in land area, cost of land acquisition, or other economic terms) of satisfying a precisely stated environmental goal (such as representation of species or habitat types), subject to additional social, economic, and environmental constraints. Stakeholders can use them as the basis of negotiations about land-use regulations. The methodologies will become increasingly important as land-use conflicts grow - when, for instance, urban and agricultural areas expand into already fragmented forests. Important areas for research and development on these methodologies include refinement of the ecological objective function and of the cost function, inclusion of land-use categories intermediate between conversion and protection, and linkages to policy instruments affecting land-use change (see below).

28. Much less well explored is the issue of the desirability and applicability of the multiple-use option. It is generally assumed that allocation of land to production forests represents a trade-off between the biodiversity advantages of full protection and the economic advantages of complete forest clearance. Recent work has questioned the assumed trade-off, raising the possibility that splitting multiple-use areas between full protection and full exploitation/conversion may in some circumstances be superior to multiple use on both economic and environmental grounds. This is an important area for investigation and applies as well to land uses such as agro-forestry and plantation forestry.

(ii) Instruments for land-use allocation

29. To date, zoning has been the predominant instrument for enforcing land-use plans. Zoning can be effective when enforced, but establishing and enforcing it can be problematic when there are strong economic and political pressures for forest conversion or exploitation.

30. Road-network planning, in the context of regional development planning, is an extremely powerful tool for affecting the spatial configuration of forest conversion and exploitation. Intensification of the road network in favourable agroclimatic areas and a prohibition of road expansion in sensitive areas would

be efficient methods of achieving conservation goals, though they might raise important issues of geographical equity.

31. A relatively unexplored but potentially promising complement to zoning is the use of economic instruments. Just as pollution charges and permits have reduced the cost of achieving pollution reductions relative to "command and control" approaches, so too might economic instruments facilitate the reservation of forest areas with the lowest opportunity cost. A general approach would take bids from forest owners for acceptance of easements restricting land-use change and the degree of forest exploitation. The easements might be financed from general tax revenue or from the sale of carbon offsets, as in Costa Rica. Alternatively, a system of tradable development rights might be instituted. Landholders in environmentally sensitive areas would be forbidden to develop their property but would be allowed to sell their foregone rights to landowners in less sensitive areas. The latter could use those rights to offset requirements for local forest maintenance. Much work needs to be done in this emerging policy area to derive simple, enforceable and effective economic instruments for efficient land-use allocation.

(b) Regulation and taxation of logging

32. Landowners (often the Government) regulate logging by:

(a) Establishing mandatory management criteria; for instance, there may be rules about which species and what overall proportion of trees can be cut; minimum diameter limits on cutting; prescribed rotation lengths; maximum slopes; and so forth;

(b) Setting up a fee system or taxation structure that governs log production or concession allocation;

(c) Prescribing the length and renewability of concessions or use rights;

(d) Setting up a monitoring and enforcement system.

33. These regulations, together with market conditions and available technologies, determine the intensity of logging and management activities and their impact on biodiversity, carbon storage, logger profits, monitoring and enforcement costs, and quasi-rents accruing to the landholder. Understanding the resulting trade-offs and complementarities is essential to understanding cost-effective means of preserving biodiversity and reducing carbon emissions and to understanding the distributional effect of different taxation systems. There is much speculation but little empirical information on these relationships. Some open questions include:

(a) To what extent does increasing the strictness of logging regulations or management criteria lead to diminishing environmental benefits, increasing opportunity costs, increasing monitoring and enforcement costs, and decreased compliance?

(b) Under what conditions does a strategy of allowing a single harvest of a forested area, followed by protection, dominate a sustained-yield strategy on

criteria of net present value of profits, carbon storage, and biodiversity preservation?

(c) Which reduced-impact logging techniques are privately profitable? If they are privately profitable, what prevents their spontaneous diffusion?

(d) Does low-rent capture result in efficiency losses or merely have distributional effects?

(e) Is better forest management promoted by granting longer concession periods?

(f) Which is more effective for enforcing regulations, a system of performance bonds or a system of renewable short-term concessions?

(g) What are the costs and benefits of alternative monitoring and enforcement approaches? Is it possible to emulate modern systems of industrial pollution monitoring and enforcement, which depend on audited self-reporting?

(c) Areas for research and development

34. Policy-oriented research and pilot studies are needed in the following areas:

(a) The effectiveness of land-use zoning;

(b) Development and application of economic instruments for allocating land to conservation;

(c) The economic and environmental implications of alternative forest tax and regulatory schemes;

(d) The costs and benefits of innovative methods for monitoring and enforcement of regulations, including performance bonds, concession renewability conditions and public disclosure of environmental impacts.

C. Future supply of and demand for wood products and non-wood forest products

1. IPF conclusions and proposals for action

35. A primary analysis of future supply and demand prospects was provided to the Panel in a study sponsored by the Government of Norway, entitled "Long-term trends and prospects in supply and demand for wood products, and possible implications for sustainable forest management". A substantive discussion of the specific issues and implications arising from the study was beyond the scope of the Panel's deliberations, although it recognized the key importance of fundamental economic principles in determining the future of forests. As a consequence, it urged countries:

"To assess long-term trends in their supply and demand for wood, and to consider actions to promote the sustainability of their wood supply and their means for meeting demand, with a special emphasis on investment in sustainable forest management and the strengthening of institutions for forest resource and forest plantations management."

36. The Panel's conclusions and proposals for action acknowledge the importance of a future supply of and demand for wood and non-wood products in determining the future of forests and call for action in several areas.

2. Major issues in future supply of and demand for wood and non-wood forest products

37. A considerable body of literature addresses issues of supply and demand in forest products, mainly for industrial use. There is need to continue to study the supply of and demand for fuelwood and non-wood forest products as well as environmental services and benefits. In late 1998, a fuller analysis of the status of resource availability and its prospects will be available upon completion of the FAO global fibre supply study.

38. While there is broad consensus among recent studies that, in the immediate future, wood supplies at the global level will be adequate to maintain a level of availability that approximates the current situation for forest products at relatively stable prices, none of the recent studies predicts a surfeit of wood. There remains sufficient variability and uncertainty in forecasts to suggest that in some countries and regions the situation is less than comfortable.

39. The base statistics on which supply assessments are founded are, in general, very poor. National forest inventories are often non-existent, old, incomplete or poorly designed for current analytical needs. In addition, utilization data, especially for non-wood products and services, are in an even worse state than those for wood for industrial purposes. To compound the challenges, the best information available is often non-standardized and in a poor statistical reporting structure both at the country level and for international reporting.

40. There are a number of central questions that have an impact on supply of and demand for forest products and services. This note raises, for the perusal of the Forum, the questions of how sustainable forest management, increased forest areas under protection, afforestation and plantations might affect future supply and demand.

41. The following analysis attempts to give further insight into the broader supply and demand issues which will have a significant impact on the ability of forest policy makers to prescribe appropriate forest policies and policy frameworks.

(a) Demand

42. The key drivers of demand for forest products are population growth and increasing wealth (reflected to some extent in GDP). A range of other factors

also significantly affect demand, including the price competitiveness of forest products relative to non-wood products, the technical competitiveness of wood products against substitute products, and consumer preferences for wood vis-à-vis non-wood alternatives.

43. The role of population growth in increasing demand for forest products and other products is recognized and understood. Increasing income is a principal factor underlying projections of increasing demand for forest products. Mainly three areas - North America, Asia and Europe - geographically dominate the world's industrial forest products economy. A correlation between increasing incomes and preferences for environmentally friendly products and outcomes suggests a future of increasingly complex interplay in the demands placed on forests and the relative acceptability to consumers of forest products and competing non-forest substitutes.

(b) Supply

44. Supplies of forest goods and services have four main sources: natural forests, planted forests, trees outside forests, and alternative fibres. These sources provide the resource needs for industrial wood, fuelwood and non-wood forest products and also for an extremely complex array of forest services.

45. Since forests are very dynamic ecological and economic systems, developing appropriate frameworks for forest policy formulation is a significant challenge. In addition, there are also new sources of supply which provide opportunities for meeting increasing demands for forest products.

(i) Wood fuels

46. A large proportion of wood fuels come from trees outside forests, and hence supply conflicts with industrial usage are generally infrequent; in fact, inefficient resource use may occur as a result of inaccessibility of industrial wood residues to wood-fuel users.

(ii) Non-wood forest products and services

47. Forests provide a vast range of non-extractive environmental services and benefits alongside wood and non-wood forest products. The estimated global value of forest rood is about $20-$25 billion. The key issues associated with supply of non-wood forest products are related to their small scale and lack of development in an industrial sense.

48. For forest services, the key issues relate to developing appropriate pricing methodologies and mechanisms which will ensure that the full economic value of forests is recognized.

(iii) Land-use change: deforestation and forest degradation

49. Deforestation remains a serious policy issue for some forest regions. A meaningful analysis of changes in the world's forests requires a differentiation between increases or decreases of forest area and the changes in forest condition. The most frequently reported parameter is change in forest cover.

Forest quality, although equally important for wood supply, is less intensively observed and monitored. Given that the change in forest area is negative in five out of eight regions in the world, deforestation can be expected to remain a prominent issue in the policy debate over forests.

(iv) Sustainable forest management

50. In forests available for wood supply, the shift towards sustainable forest management means combining wood production with other management objectives. Conceptualization of sustainable forest management has outpaced the development of specific on-the-ground practices that will achieve sustainability. From a production perspective, this shift could have implications for timber supply and raises the question whether unacceptable economic hardship will be created during the adjustment phase. A potential brake on global flows of forest products would occur if the forest areas of key producer countries become inaccessible (for policy reasons) as a source of industrial forest products. Similar supply implications can also be seen if substantial forest areas are set aside as protected areas.

(v) Planted forests, afforestation rate and development gains

51. Since the growth on plantations is much higher than in natural forests, policy developments that promote the use of plantations will have a significant impact on fibre supplies, as well as easing the pressures on natural forests. In general, it can be concluded that good tree improvement programmes will result in considerable gains in wood yields from tropical and non-tropical forest plantations.

(vi) Alternative fibres

52. Currently wood is the major raw material in the global pulp and paper industry. However, waste paper is making significant inroads, and all regions except North America consume more waste paper than they recover. Significant levels of non-wood fibres are used in a handful of countries, using sources that are usually more intensely grown than wood. Non-wood paper is often produced in smaller pulp and paper mills which are frequently unable to afford pollution-abatement technologies. Policies need to recognize and respond to the fact that, in attempting to preserve forests for environmental reasons, the environmental problem might shift downstream, with maybe even more damage to the environment. A host of other issues also influences supply of and demand for wood and non-wood products and forest services. Supplementary wood and fibre sources such as trees outside forests (especially for fuelwood) and agricultural tree-crops are also important in reducing pressure on forests. Similarly, considerable analysis has been carried out on the roles and impacts of factors such as the economic accessibility of wood supplies, the impact of integrated forest management, material efficiency, the social dimensions of forest product supplies, and the roles of institutions and institutional arrangements.

D. Rehabilitation of forest cover

1. IPF proposals for action

53. The report of the Panel outlined priority items for consideration relevant to assessing, monitoring and rehabilitating forest cover in environmentally critical areas, including

(a) The need to determine the underlying causes of deforestation;

(b) Giving further consideration to the currently neglected traditional forest-related knowledge;

(c) The need for regular monitoring of forest cover and its rehabilitation, including assessments of transboundary studies;

(d) Better assessment of forest area under conservation or any other protected status;

(e) Clear setting of research priorities.

The report made a number of other important observations, notably that:

(a) Effective assessment, monitoring and evaluation are a major policy issue;

(b) Poverty and demographic pressures are the root causes of deforestation (although it also follows that deforestation delivers the global benefit of increased food security through expanding agriculture);

(c) Environmental impact assessments should be used as a basis for action against uncontrolled conversion of forest land for other purposes.

2. Major issues in rehabilitation of forest cover

54. A review of the assessment, monitoring and rehabilitation of forest cover in environmentally critical areas must start with the understanding that forests and trees are renewable resources. It should consider the nature and causes of deforestation and degradation and under what conditions tree cover could be restored. The key questions relate to:

(a) Shared understanding of concepts, including forest cover, degradation, environmentally critical areas, areas under potential or actual threat;

(b) Identification of the location of the critical areas and opportunities for carrying out rehabilitation work;

(c) The importance of deforested and degraded areas;

(d) The means available to rehabilitate and monitor progress within the context of adequate criteria for assessment.

55. Critical areas are understood to include dry zones, mountain areas, coastal areas, freshwater swamps and land degraded through unsustainable agriculture. Although trees and forests are highly adaptable renewable resources which, given protection from damage, will regrow on most types of land, in critical areas the site conditions and external factors acting on the site make the growth, regrowth or development of forest cover difficult.

(a) Dry zones: desertification and silvo-pastoralism

56. The important international instruments dealing with dry zones are the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, and chapter 12 of Agenda 21. The Convention to Combat Desertification notes that information on rates and causes of desertification are still needed, especially for Africa, and proposes a target of the year 2001 for every country to have a policy for dry lands. It emphasizes capacity-building, partnerships between civil society and non-governmental organizations, and the empowerment of people along with an assessment of trees, woodlands and forests and of the processes leading to degradation - the forerunner to desertification. It also emphasizes the need for peoples' participation in decision-making and management, decentralization and the value of a mix of local, national and international partnerships at all levels.

57. An expert meeting held in 1996 in Lisbon, Portugal, under the auspices of the Governments of Cape Verde, Portugal and Senegal, listed many constraints on development in dry zones, noting particularly the use of trees for the support of sustainable livelihoods and the need for a holistic approach. The low potential biomass yield in dry zones means that tree products should ideally be of high value and low biomass content, such as honey, silkworms or medicinal plants. Low-value crops such as fuelwood usually give low benefit/cost ratios which, although not likely to encourage outside investment, provide socio-ecological benefits such as shade, forage, food products.

58. The recommendations of the Lisbon experts meeting and those of the Second Expert Consultation on the Role of Forestry in Combating Desertification both point to some strong critical policy goals, including:

(a) The existence of national forest policies for dry lands, drawn up with peoples' involvement and incorporating sound ecological management principles;

(b) Clearer tenure arrangements to promote higher security in resource use, management and conservation;

(c) Prioritization of preventive measures for action;

(d) The need for guidelines to help decision-makers in choosing species and techniques for plantations and doing so on a truly participatory basis;

(e) Improvement of training and education at all levels, together with revision of teaching curricula and a new approach to extension;

(f) Basing action on environmental safety, social acceptability and economic relevance.

(b) Mountain forests: catchments and biodiversity

59. The relevant parts of the international instruments are chapter 13 of Agenda 21[4] (Managing fragile ecosystems: sustainable mountain development), chapter 15 (Conservation of biological diversity) and chapters 10-12 as well as the "Forest Principles"[3] and the Convention on Biological Diversity.[5] Mountains are particularly fragile due to their high energy environments; they are frequently regions of active geomorphological change and are characterized (compared with hills) by distinct altitudinal climatic belts. Cloud forests are especially vulnerable, because once the trees have been removed, they may receive virtually no rainfall. It is noteworthy that some of the world's oldest organisms and some of its most threatened animal species (e.g., the gorilla) are found in cloud forests.

60. FAO estimates that upland forests are being lost at an annual rate of 1.1 per cent, greater than elsewhere in the tropics. A major feature of many mountain forests is slash-and-burn agriculture, often due to the economic and political marginalization of the cultivators. The promotion of agroforestry on individually held land is often regarded as more effective than setting up communal forestry schemes in those areas. In natural upland forests, women are often the de facto managers, receiving little recognition and no management authority.

61. The quantity and variety of resources coming from mountain forests are often unsustainable, and their value often accrues to downstream beneficiaries rather than to the mountain communities. Since the most important forest product of many mountains is water, many Governments have labelled them "protection" forests. The downstream beneficiaries who receive the water, such as owners of irrigated farmlands, make little or no reinvestment either in the resources themselves or in the mountain communities.

62. The rehabilitation of mountain forests by tree planting poses a dilemma in the choice of species. Other options for the rehabilitation of mountain and mountain forest ecosystems are more socio-ecological objectives, broader based management systems, better harvesting practices and an enabling political environment, and shift away from a concern with biomass production. The essential prerequisite and facilitating framework will include the recognition of services rendered by mountain ecosystems and their dwellers to lowland communities and systems and the necessity for compensation in a comprehensive consideration of local and national economies.

(c) Coastal zones, especially mangrove forests

63. Mangroves represent the single most important coastal forest formation in the world. Deforestation in mangrove forests can cause coastal erosion and interrupt important ecological succession in the stabilization of materials deposited at the mouths of rivers. Mangroves are important sources of wood products and provide habitats for rare species of avifauna. Some acid sulphate soils are especially susceptible to degradation when cleared for agriculture and

should be avoided for this purpose. In view of the aquatic environment, aerial sprays of agricultural chemicals should be avoided as should mining operations, which present special hazards. What is most needed if mangroves are to be saved are strong policy options that address the need for integrated approaches to the use and conservation of mangroves; take into account the multiple services they provide; raise awareness of and evaluate continuously the environmental impact of development initiatives on mangroves; and envisage social promotion of societies dependent on mangroves.

(d) Degraded sites arising from unsustainable agriculture

64. The planting of suitable woody species may often restore soils that have been exhausted or made otherwise unproductive from exploitative agriculture. Recent work on planted fallows shows what can be achieved at some tropical sites with certain tree species producing highly priced products. The need to address the restoration of alkaline and saline soils, which are no longer productive as a result of land clearance and improper irrigation techniques, is an important special concern. Large areas of such soil exist, although they are not regarded as key for the restoration of forest cover. The need for sustainable agriculture is of great importance to the forest sector in this respect.

(e) Objectives and prerequisites for successful restoration and rehabilitation of forest cover

65. Degradation and deforestation entail loss of ecosystem productivity, elimination of natural buffer systems, reduced biological diversity, and impairment of all the physical and biological services and functions provided by forest and tree resources. Rehabilitation will aim at restoring the balance and the associated natural processes maintaining forest ecosystems. The process of rehabilitation can only effectively take place with clearly defined objectives, against which progress can be monitored. Some objectives are to:

(a) Establish nursery crops to restore, eventually, a previous ecosystem;

(b) Establish ground cover to protect soils from erosion;

(c) Protect watersheds and catchments, feeding rivers and hydro-electric dams;

(d) Manage a single species with a view to promote understorey diversity;

(e) Create a wood resource to take the pressure off natural formations.

66. One of the most important prerequisites for successful rehabilitation is clear definition of the control over the land in question. In most cases there will be several parties or stakeholders interested in the future use of even heavily degraded or deforested land. It is useful to identify the secondary stakeholders who may have considerable influence on the land/forest reserve as well as the primary stakeholders who have a direct stake in it. A recent preliminary study carried out in six African countries has tested a concept of four "Rs" for stakeholder analysis and conflict resolution. They are Rights, Responsibilities, Revenues/returns and Relationships.

(f) Technical factors

67. Technical packages exist for most rehabilitation situations, depending on the objectives of the process. They fall naturally into two major groups: the use and encouragement of natural regeneration; and the introduction of germplasm through planting. There are many options combining the two approaches. In almost all situations, rigorous protection from grazing, fires and exploitation, along with soil conservation work, will ensure the recovery of some vegetative cover and is usually the cheapest option; it may, however, entail serious loss of benefits to poorer stakeholders.

68. Plantations may contain single species or mixtures, indigenous or exotic. Introduced species may have a rehabilitation capacity that indigenous species do not, such as an ability to deep-root in degraded or lateritic soils or to withstand drought and high winds on sand dunes. Introduced species of cash crops, forage or domestic animals may meet the aspirations of farmers better than local species. An exchange of information between technical foresters and local people, giving full weight to traditional forest-related knowledge, could result in a better choice of species.

IV. PREPARATIONS FOR SUBSTANTIVE DISCUSSION

69. The issues listed under category II.d in the first report of IFF are scheduled for substantive discussion at the third session of the Forum. To facilitate that discussion, a report which describes the issues in greater detail will be prepared. The Forum may wish to guide preparations for the report by identifying matters that need further analysis and elaboration and by considering some of the questions raised in this note.

Notes

[1] E/CN.17/1997/12, para. 28 (a).

[2] See A/AC.241/27.

[3] Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigenda), resolution 1, annex II.

[4] Ibid.

[5] Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests. Ibid., annex III.

[6] See United Nations Environment Programme, Convention on Biological Diversity (Environmental Law and Institutions Programme Activity Centre), June 1992.